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of

RUSTON PANABAKER

for

INTERACTIVE TELEVISION SCHEMA

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BACKGROUND OF THE INVENTION

1. The Field of the Invention

The present invention relates to systems and methods for generating enhanced programming or enhanced programming content. More specifically, the present invention relates to systems and methods for providing a structured schema for the development and delivery of enhanced programming or enhanced programming content.

2. The Prior State of the Art

For numerous years, homes, offices and other buildings have accessed television programming through airwave broadcasts, cable providers, satellite transmission, and other communication channels. Televisions provide viewers with a varied assortment of entertainment, news, and educational programming. From the first broadcasts to current television programming, viewers may gather a wealth of knowledge, while being entertained. With advances in communication technology and computer systems in recent years, television broadcast viewers no longer are limited to merely watching a television screen. Instead, television viewers may watch programming on a computer monitor or display or using an advanced set-top box appliance affording computer like functionality, while performing a variety of other tasks, such as word processing, surfing the Internet, playing games, and the like.

Of particular interest, in recent years there has been an explosion with the availability of enhanced programming experiences associated with traditional television broadcast programming. Such enhanced programming experiences allow viewers to interact with or “feel” a part of the television broadcast. For example, the enhanced programming or enhanced programming content may allow a viewer to “play-along” with participants in a

1 game show by simultaneously answering questions and accumulating points, money, prizes,
2 and the like. Additionally, current enhanced programming experiences allow viewers to
3 obtain a more thorough understanding of a particular television broadcast. This may be
4 achieved by connecting with a web site that has information relevant to the television
5 broadcast, for example connecting to a sport related web site to obtain a baseball player's
6 statistics. This enhanced programming content may or may not be created specifically for
7 video and audio programming, and may or may not have elements which are synchronized to
8 the linear video programming. Numerous attempts have been made to provide enhanced
9 programming or enhanced programming content, such as interactivity, in a straightforward
10 and efficient manner. From the initial development of enhanced programming experiences,
11 manufacturers and providers have attempted to develop hardware and software to give a
12 television broadcast viewer an interactive experience. Such enhanced programming
13 experience may eliminate the television broadcast or combine enhanced programming or
14 enhanced programming content with the television broadcast.

15 Typically, the hardware and software modules capable of delivering and displaying
16 such enhanced programming or enhanced programming content are specific to a particular
17 manufacturer and/or programming or content provider. Similarly, the format of the enhanced
18 programming or enhanced programming content is limited by the specification of the
19 hardware and software modules used to deliver and display the enhanced programming or
20 enhanced programming content. Further, each enhanced programming format is configured
21 for the specific network upon which the data was transmitted. For example, formats for
22 enhanced programming and enhanced programming content developed for European
23 television and satellite systems are incapable of operating on United States of America cable
24 and satellite systems. Consequently, a viewer is currently limited in their enhanced

1 programming experiences by limitations associated with the allowable programming format
2 of the television broadcast provider and the equipment that may receive such programming.
3 In addition, enhanced programming authors must create enhanced programming or enhanced
4 programming content in a variety of different formats so that the programming or content may
5 be supplied by different providers and viewed through different manufacturer's equipment.

6 In light of the above, it would be desirable to obtain an enhanced programming
7 standard that allows authors of enhanced programming or enhanced programming content to
8 develop the same within a framework that is transportable between different hardware and
9 software modules and networks or systems used to provide an enhanced programming
10 experience.

SUMMARY OF THE INVENTION

The present invention is directed to a schema that defines an enhanced programming experience in a simple and efficient manner. Among other things, the schema provides a framework within which an author may develop a multi-platform enhanced programming experience. The schema preferably conforms with enhanced programming standards related to the Advanced Television Enhanced Forum, while permitting enhanced programming to be experienced over a variety of different communication networks.

In one embodiment, a receiver module is configured to display programming to a viewer and provide an enhanced programming experience to the viewer. The receiver module incorporates a management system to control delivery of the enhanced programming experience and a display unit or device that displays the programming or enhanced programming or enhanced programming content to a viewer.

The enhanced programming experience may allow a viewer to interact with programming, such as "playing along" with a game show. A schema that is stored in a schema document defines this experience. The schema defines control parameters and data structures that identify (i) the availability of enhanced programming or enhanced programming content, (ii) where the enhanced programming or programming content is stored, (iii) when the enhanced programming or programming content is to be delivered, and/or (iv) what enhanced programming or programming content is to be delivered.

In another embodiment, an interactive module acts as an authoring tool for developing enhanced programming content associated with an enhanced programming experience. The interactive module includes a data storage module for storing enhanced programming or enhanced programming content, applications, and the like. Further, the interactive module includes an application module that acts as an authoring tool to create enhanced programming

1 experiences. In addition, the application module retrieves stored enhanced programming or
2 enhanced programming content from the data storage module and prepare such enhanced
3 programming or enhanced programming content for delivery to the viewer. In this manner,
4 the application module provides dual functionality by authoring enhanced programming or
5 enhanced programming content and preparing enhanced programming or enhanced
6 programming content for delivery to a viewer.

7 According to another aspect, the invention relates to numerous methods for creating a
8 schema document or file containing enhanced programming or enhanced programming
9 content. Additionally, numerous methods for delivering enhanced programming or enhanced
10 programming content based upon the schema are provided. Illustratively, one method
11 includes a step for retrieving a schema document that includes at least one of an
12 announcement, a trigger, and a package. Each of the announcement, trigger, and package has
13 a different data structure, such as an announcement data structure, a trigger data structure, and
14 a package data structure. The method further includes a step for generating a timeline from
15 the schema document. Such a timeline incorporates a schedule or list that defines delivery
16 times for the delivery of one or more of the announcements, the triggers, and the packages to
17 the receiver module. Optionally, substituted for the generating step may be a retrieving or
18 accessing step when the schema document includes a timeline. Following the creation of the
19 timeline, the method may entail a step for delivering at least one of announcement, trigger,
20 and package to the receiver.

21 Alternatively, the method includes a step for generating a carousel from the schema
22 document. The carousel incorporates a list of when at least one of the announcement, the
23 trigger, and the package are deliverable to the receiver module. When a carousel is used as
24 part of the method steps, the present invention may include a step of delivering the

1 announcement, the trigger, and the package within the substantially shortest time possible
2 based upon the communication line connection and the enhanced programming experience to
3 be delivered to the receiver module. As with the step of generating the timeline, the step of
4 generating the carousel may be substituted by a retrieving or accessing step when the schema
5 document includes a carousel.

6 According to another aspect of the present invention, the schema document or file is
7 verified against a master or standardized schema document to determine the authenticity and
8 structure of the document.

9 In this manner, the invention provides schemas, systems, and methods for creating,
10 retrieving, and displaying an enhanced programming experience no matter the type of
11 communication line connection or hardware and/or software modules employed to create,
12 deliver, and display the enhanced programming experience.

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Embodiments within the scope of the present invention also include computer-readable media for carrying or having computer-executable instructions or data structures stored thereon. Such computer-executable instructions may comprise, for example, instructions and data that cause a general purpose computer, special purpose computer, or special purpose processing device to perform a certain function or group of functions. Hence, computer-readable media may be any available media accessible by a general purpose or

1 special purpose computer. By way of example, and not limitation, such computer-readable
2 media may comprise physical storage media such as RAM, ROM, EEPROM, CD-ROM or
3 other optical disk storage, magnetic disk storage or other magnetic storage devices, or any
4 other medium that carries or stores desired program code means in the form of computer-
5 executable instructions or data structures and is accessible by a general purpose or special
6 purpose computer. When information is transferred or provided over a network or another
7 communications connection (either hardwired, wireless, or a combination of hardwired or
8 wireless) to a computer, the computer properly views the connection as a computer-readable
9 medium. Thus, such a connection is also properly termed a computer-readable medium.
10 Further, combinations of the above are also included within the scope of computer-readable
11 media.

12 The present invention will be described in the general context of computer-executable
13 instructions, such as program modules that may be incorporated within the illustrative schema
14 used to author and provide enhanced programming content to a viewer via, set-top boxes,
15 receivers or other computers. Generally, program modules include routines, programs,
16 objects, components, data structures, etc. that perform particular tasks or implement particular
17 abstract data types. Computer-executable instructions, associated data structures, and
18 program modules represent examples of program code means for executing steps of the
19 methods disclosed herein. The particular sequence of such executable instructions or
20 associated data structures represents examples of corresponding acts for implementing the
21 functions described in such steps.

22 Figure 1 and the corresponding discussion are intended to provide a general
23 description of an illustrative suitable environment in which the invention may be
24 implemented. In the discussion, reference is made to a home entertainment system that may

1 be used for displaying and/or recording programming. For purposes of this description and in
2 the claims, a "home entertainment system" may be a display unit, such as a television screen,
3 coupled to a processing device for performing the data processing steps disclosed herein, or
4 may include any number of interconnected consumer electronic devices. Illustratively, one or
5 more of the consumer electronics has a processing device for performing the data processing
6 steps and methods disclosed herein. Examples of such consumer electronic devices include a
7 video cassette recorder ("VCR"), a video game system, a stereo system, a television or
8 monitor with data processing capabilities, a cable television box, a digital satellite system
9 receiver ("DSS"), a digital video broadcasting system ("DVB"), Multimedia Home Platform
10 ("MHP"), a digital versatile disc system ("DVD"), a set-top box that serves as an Internet
11 terminal, and any other device capable of processing data or performing the methods as
12 described herein. Furthermore, the term "home entertainment system" is to be understood as
13 a term that broadly describes a television-viewing environment, whether it is located in a
14 viewer's home, at a place of business, in the public, or at any other location. Also for
15 purposes of this description and in the claims, the term "programming" includes both the
16 viewable portions of moving image data and sound data, which is optionally presented to a
17 viewer with the viewable portions of moving image data.

18 In one embodiment, the present invention is implemented in a system that uses a
19 conventional television screen or other display unit to display information and optionally
20 includes a reviewer adapted to obtain programming and/or enhanced programming content or
21 a WebTV® set-top box or a similar Internet terminal that has been adapted to perform the
22 operations that include composing, sending and receiving email, browsing the World Wide
23 Web ("Web"), accessing other segments of the Internet, and otherwise displaying
24 information. An Internet terminal typically uses standard telephone lines, Integrated Services

1 Digital Network (ISDN) lines, cable lines associated with cable television service, or the like
2 to connect to the Internet or other wide area networks.

3 Figure 1 illustrates a home entertainment system 10 that includes a management
4 system 12, a display device 14 and an audio system 16. Management system 14 may be a
5 receiver or a set-top box or Internet terminal that has been adapted to perform the operations
6 disclosed herein and use the schema of the present invention. Management system 12 may be
7 integrally positioned with or separate from display device 14, which may be a high definition
8 television display, a standard television display, a flat panel display, a projection device, a
9 high definition television display, a computer monitor, or any other device capable of
10 displaying viewable video image data. Audio system 16 may be a speaker, a stereo system, or
11 any device capable of emitting sound data, and similarly may be integrally positioned with or
12 separate from display device 14.

13 Management system 12 includes, in one embodiment, a signal input 18, which
14 receives programming from a signal source 20. The programming is transmitted from signal
15 source 20 to signal input 18 via a programming input line 22, which may be a cable or optic
16 connection, a terrestrial antenna system, a satellite system, or any device or system capable of
17 transmitting programming to home management system 12.

18 The signal source 20 may be either a single channel signal source or a multiple
19 channel signal source. A single channel signal source provides programming from a recorded
20 medium, such as a videocassette, compact disc, etc. Examples of a single channel signal
21 source include a VCR, a DVD, and the like. Alternatively, a multiple channel signal source
22 includes any system or device that is capable of sending a signal that may be received by a
23 satellite receiver, a cable or optic connection, a terrestrial antenna, or the like. Examples of a
24

multiple channel signal source include DSS/DVB, a cable box, locally broadcast programming (i.e. programming broadcast using UHF or VHF), and the like.

While Figure 1 illustrates home entertainment system 10 as having a single programming input line 22 and a single signal source 20, there can instead be a plurality of programming input lines that transmit programming from a plurality of signal sources. In such embodiments, the home entertainment system may receive the programming from one signal source or from a plurality of signal sources at a time.

Management system 12 also includes a user input interface 24, which receives input from an input device 26, such as a remote control, keyboard, microphone, or any other device capable of generating instructions, such as electronic instructions, for management system 12. Input device 26 may communicatively couple with management system 12 over an input link 28 so as to enable input device 26 to control home entertainment system 10. Input device 26 generates instructions over input link 28 in response to either preprogrammed data or in response to a viewer pressing buttons on input device 26. Input device 26 may optionally control Web browser software within management system 12 when management system 12 is a receiver or set-top box or an Internet terminal that is adapted to perform the operations disclosed herein. For instance, input device 26 may be programmed to turn on home entertainment system 10 and to tune management system 12 to a channel.

Figure 1 illustrates a signal recorder 30, which is capable of receiving video and/or audio data and recording the data on a storage medium. Video signals are transmitted to signal recorder 30 and/or display device 14 by a video image link 32, examples of which include a radio-frequency ("RF") link, an S-video link, a composite link, or any other equivalent form of video image link. Similarly, audio link 34 transmits audio data from management system 12 to audio system 16 or to signal recorder 30.

1 In one embodiment, the operation of management system 12 is controlled by a central
2 processing unit ("CPU") illustrated as processing unit 36, which uses computer-executable
3 instructions implemented in software and/or hardwired logic circuitry. As shown, an
4 application-specific integrated circuit ("ASIC") 38 is coupled to processing unit 36.
5 Processing unit 36 and ASIC 38 may be coupled via a system bus 40, which interconnects
6 various other system components. For example, the system components may include system
7 memory 42, mass storage interface 44, user interface 24 and signal input 18. Processing unit
8 36 may execute software designed to implement features of management system 12 including
9 one or more features of the present invention. ASIC 38, optionally, contains circuitry that is
10 used to implement certain functions of management system 12. Instructions, data, and other
11 software for the operation of processing unit 36 and ASIC 38 may be stored in system
12 memory 42, such as in read-only memory ("ROM") 46, in random-access memory ("RAM")
13 48, and/or in a mass storage device 50. Such memory 42, 46, and 48 may be coupled to mass
14 storage interface 44. ROM 46, RAM 48 and mass storage device 50 may be communicatively
15 coupled to ASIC 38 so as to be readable by ASIC 38, and to allow data to be written from
16 ASIC 38 to RAM 48 and possibly mass storage device 50.

17 Mass storage device 50 may be a magnetic hard disk 52 or any other magnetic or
18 optical mass memory device that is capable of storing large amounts of data. Any desired
19 computer-readable instructions or data, including application programs 54, other program
20 modules 56, and an electronic programming guide ("EPG") 58, which specifies the broadcast
21 times and channels of programs can be stored in mass storage device 50.

22 EPG data may be obtained in a variety of manners, as known by one skilled in the art.
23 For instance, the EPG data can be supplied to management system 12 by a remote computer
24 60, such as a server, and stored on mass storage device 50. Optionally, the EPG data is

1 supplied on a regular basis to maintain a current schedule of programming at management
2 system 12. Where home entertainment system 12 is associated with the Internet, the EPG
3 data may be downloaded directly from one or more hardware modules, such as servers or
4 other clients, accessible via the Internet. Alternatively, the EPG may delivered to the home
5 entertainment system by using a direct-dial communication over standard telephone lines or
6 by using data transmission over the cable television infrastructure, a satellite network, an
7 over-the-air broadcasting or any other available medium.

8 In the embodiment where management system 12 is associated with the Internet or
9 from other wider area network (WAN) 62 or local area network (LAN) management system
10 12 optionally communicates with a remote computer 60 by a serial port interface 64
11 interposed between system bus 40 and a modem 66, a wireless link, or some other means for
12 establishing communications between management system 12 and remote computer 60.
13 Management device 12 may, optionally, transmit information via the Internet by direct-dial
14 communication over standard telephone lines or by using any other available communication
15 medium.

16 While serial port interface 64 may be utilized to connect modem 66 for
17 communicating with remote computer 60 across a WAN, serial port interface 64 may also be
18 utilized to connect other consumer electronic devices, such as video game 68, and/or various
19 input devices, such as a keyboard (not shown) or joystick (not shown), to management device
20 12.

21 Generally, remote computer 60 may take the form of a conventional computer that
22 includes a processing unit, a system memory (including RAM, ROM, BIOS, etc.), and a
23 system bus that connects the various system components including the system memory to a
24 processing unit. The system bus may be of any type of bus structure known to those skilled in

1 the art, such as but not limited to, a memory bus, a peripheral bus, a local bus using any of a
2 variety of bus architectures and the like.

3 Optionally, remote computer 60 may include a magnetic hard disc drive for reading
4 from and writing to a magnet hard disc, a magnetic disc drive for reading from or writing to a
5 removable magnetic disc, and an optical disc drive for reading from or writing to a removable
6 optical disc, such as a CD-ROM, DVD, or other optical media. Although the example
7 environment described herein employs such drives, other types of computer readable media
8 for storing data can be used, including magnetic cassettes, flash memory cards, digital video
9 discs, Bernoulli cartridges, RAMs, ROMs, and the like. The drives described herein may be
10 connected to the system bus by an appropriate drive interface known to one skilled in the art.
11 In this manner, these drives and their associated computer-readable media provide non-
12 volatile storage of computer-executable instructions, data structures, program modules and
13 other data for remote computer 60.

14 As with management system 12, remote computer 60 may receive commands and
15 information through various input sources, such as keyboards, point devices, or other such
16 input device known to one skilled in the art. Although only a single remote computer is
17 depicted, remote computer 60 may take the form of one or more servers, routers, network
18 PCs, peer devices, or other common network nodes, and remote computer 60 may include
19 associated elements of management system 12, or other remote computers as described
20 herein. Additionally, although remote computer 60 is represented as being connected to
21 management system 12 through wide area network 62 and modem 66, it may be understood
22 that remote computer 60 may communicate directly with signal input 18 without the need for
23 the wide area network 62 and modem 66.

1 Referring now to signal input 18, if the signal on programming input line 22 includes
2 multiple channels, management device 12 may include a tuner 70 that tunes to a selected
3 channel of the signal. In other embodiments of the present invention, multiple tuners 70 are
4 to provide enhanced viewing features, such as picture-in-picture, recording one channel while
5 viewing another, and recording a plurality of channels simultaneously. A signal decoder 72,
6 communicating with tuner 70, converts video data from an analog format to a digital format,
7 or from a digital format to an analog format, when ASIC 38 and tuner 70 employ different
8 formats. Signal decoder 72 also decodes video data from a compressed video format (e.g.
9 MPEG). In embodiments where the management system 12 includes multiple tuners 70,
10 management system 12 includes multiple signal decoders 72 to perform the operations
11 disclosed herein.

12 As illustrated, management system 12 includes a video output 74, which may include
13 a video encoder and/or a video converter. The video encoder assigns a code to each frame of
14 video data transmitted across a video image link 32, and switches between analog and digital
15 formats as desired. Similarly, audio output 76 includes an audio converter to provide the
16 switching between analog and digital formats when needed.

17 While Figure 1 and the corresponding discussion above provide a general description
18 of a suitable environment in which the invention may be implemented, it will be appreciated
19 that the features of the present invention disclosed herein may be practiced in association with
20 a variety of different system configurations, such as that depicted in Figure 2.

21 Illustrated in Figure 2, is a schematic representation of a system 200 according to one
22 embodiment of the present invention. System 200 depicts an exemplary enhanced
23 programming system that facilitates the creation of enhanced programming by an interactive
24 module 210 and the delivery of the enhanced programming to one or more receiver modules

1 216a-216n by an encoder module 212 for viewing by an individual watching the
2 programming. Similarly, system 200 represents an enhanced programming system that may
3 retrieve stored enhanced programming content and deliver the same to a viewer. As implied
4 above, the enhanced programming includes television-programming generated by
5 programming module 218 with interactive capabilities or other enhanced programming
6 content, television-programming with additional non-interactive information or content,
7 interactive web pages substituted for the television-programming, some combination thereof
8 or additional content desired or known by one skilled in the art.

9 Typically, display of the enhanced programming occurs when a viewer watching the
10 television programming via one of receiver modules 216a-216n requests enhanced
11 programming content delivery in response to a broadcast that enhanced programming content
12 is currently available with programming matched by the viewer. Stated another way, an
13 enhanced programming experience is delivered to the viewer in accordance with a defined
14 schedule initiated by a viewer's selection using input device 26.

15 System 200 delivers the enhanced programming content received by the one or more
16 viewers without regard to the type of communication line connection or hardware and/or
17 software modules used to deliver and view the enhanced programming experience. In this
18 manner, system 200 provides an advance over the existing technologies that are hardware
19 and/or software specific. For example, the format of and manner of delivery and display of
20 typical enhanced programming content in these existing technologies is specific to the
21 particular hardware and software modules associated with its creation, delivery, and display.
22 In contrast, the present invention provides a generic or standardized enhanced programming
23 schema, which is non-specific to hardware and software modules associated with authoring
24 tools used to create the enhanced programming content or the receivers that deliver or display

1 the enhanced programming content to the viewer. Furthermore, the enhanced programming
2 schema defines a framework within which an author may develop enhanced programming
3 content with the knowledge that such content is multi-platform compatible.

4 As shown in Figure 2, system 200 includes interactive module 210. Interactive
5 module 210, in one embodiment, includes a data storage module 220 and an application
6 module 222. Interactive module 210, in one configuration, functions to generate the enhanced
7 programming content deliverable to receiver modules 216a-216n. Therefore, interactive
8 module 210 represents one example of an authoring tool that allows enhanced programming
9 authors to create enhanced programming content associated with typical audio and video
10 television programming created by programming module 218. Furthermore, interactive
11 module 210 may act as an interpreter of information stored within the schema of the present
12 invention, and subsequently deliver the enhanced programming content to one or more
13 receiver modules 216a-216n. Alternatively, interactive module 210 functions to prepare
14 stored enhanced programming content for delivery to receiver module 216a-216n. For
15 instance, interactive module 210 may collect the enhanced programming content from one or
16 more servers, prepare such enhanced programming content in accordance with a stored
17 schema, and prepare to deliver the content, such as formatting the enhanced programming
18 content in accordance with a Transport A protocol, a Transport B protocol, or the like.
19 Similarly, even though transport A and transport B protocols are discussed herein, various
20 other communication protocols may be used to deliver enhanced programming content.
21 Likewise, interactive module 210 may prepare the enhanced programming content for a
22 satellite television network, a European based television network, for some other
23 communication line connection or network.

1 As mentioned, interactive module 210 preferably prepares the enhanced programming
2 content using a transport A protocol or a transport B protocol. Transport A protocol, as
3 known by one skilled in the art, is a low speed communication protocol that delivers a trigger
4 having a trigger data structure to receiver modules 216a-216n along the vertical blanking
5 interval (VBI), captioning or text mode line, or subtitling line of the National Television
6 Standard Committee (NTSC) defined signal. Outside the United States of America, the
7 trigger may be delivered to receiver modules 216a-216n by an equivalent line based upon the
8 Phase Altering Line (PAL) standard or the Sequential Couleur Avec Memoire or Sequential
9 Color with Memory (SECAM) standard. The transport A protocol uses a first path to deliver
10 one or more triggers to receive module 216a-216n, while using a second path, typically a
11 connection to the Internet via a telephone line or some other communication line connection,
12 to deliver the data requested by receiver module 216a-216n in response to the trigger. Hence,
13 a two-way connection allows receiver modules 216a-216 to obtain the data identified by the
14 trigger.

15 In contrast to the transport A protocol, the transport B protocol is network
16 independent, such that receiver modules 216a-216n is not necessarily separately connected to
17 the Internet to obtain data from the one or more data sources containing the enhanced
18 programming content, as is the case with the transport A protocol. The transport B protocol
19 initially delivers an announcement having an announcement data structure to identify the
20 availability of enhanced programming. Subsequently, when the viewer desires an enhanced
21 programming experience, the transport B protocol allows delivery of a trigger to activate
22 display of the enhanced programming content and the data containing the enhanced
23 programming content to receiver modules 216a-216n along a single path. Transport B is
24 specifically designed to work over Internet Protocol networks of all types and in a uni-

1 directional manner. Other protocols providing the similar facilities to Internet Protocol could
2 be used as well. This invention is intended to work with all protocols and delivery systems
3 that retain the information contained within the schema file. Optionally, transport B protocol
4 accommodates a return path from receiver modules 216a-216n so that additional data may be
5 accessed as needed.

6 To store enhanced programming content, and optionally other application software to
7 facilitate receiving, creating, and delivering such enhanced programming content, interactive
8 module 210 includes a data storage module 220. Data storage module 220, in one
9 embodiment, is a database or other known data storage hardware and/or software module(s)
10 that maintain one or more records, files, and fields of enhanced programming content, while
11 allowing application module 222 access to such records, files, and fields. For instance, data
12 storage module 220 may store the enhanced programming content developed through
13 application module 222 or retrieved from some other data storage module(s). Data storage
14 module 220 may also be implemented as one or more relational, hierarchical, hypertext, or
15 distributed databases. Alternatively, data storage module 220 may be a magnetic hard disk, a
16 removable magnetic disk, and an optical disk, such as a CD-ROM or other optical media, and
17 the like.

18 In one embodiment, data storage module 222 contains various data structures, such as
19 one or more announcement data structures, trigger data structures, package data structures,
20 timeline data structures, carousel data structures, and the like, which define the enhanced
21 programming content and manner by which such enhanced programming content may be
22 delivered to the viewer as will be explained below. Alternatively, data storage module 222
23 may access enhanced programming content stored remotely from interactive module 210,
24 while accessible by data storage module 220 and/or application module 222. Further,

1 although a single data storage module 220 is illustrated, it may be appreciated by one skilled
2 in the art that the present invention may use a plurality of data storage modules 220. The
3 storage function of storage module 220 could also be accomplished by the inclusion of both
4 the enhanced programming content, and the information contained in the schema file, in a
5 single container format, such as a file. Such a file might then represent all of the data and
6 information needed to create and deliver the enhanced television experience.

7 Communicating with data storage module 220 is application module 222. Application
8 module 222, in one embodiment, controls the manner by which the enhanced programming
9 content is prepared for delivery to receiver modules 216a-216n. In an alternate configuration,
10 application module 222 represents a tool that aids an author with generating enhanced
11 programming content. Consequently, application module 222 optionally assists authors to
12 develop enhanced programming content within a standardized schema, while facilitating the
13 transport of such enhanced programming content to receiver modules 216a-216n via a variety
14 of different programming and enhanced programming providers. Thus, application module
15 222 is configured to allow an author to create enhanced programming content within a
16 standardized schema and know that the enhanced programming content is compatible with
17 any hardware and/or software modules used by providers and viewers of the enhanced
18 programming content. In this manner, the schema limits incompatibility problems between
19 enhanced programming content and the hardware and/or software modules of various
20 manufacturers and providers.

21 To assist with the delivery of the enhanced programming content to receiver modules
22 216a-216n, system 200 optionally includes an encoder module 212. Encoder module 212
23 communicates with interactive module 210 and programming module 218 through network
24 212, directly, as illustrated with dotted lines, or a combination thereof. As mentioned before,

1 interactive module 210 acts as an interpreter of the information defined within the schema of
2 the present invention, thereby allowing interactive module 210 to prepare the enhanced
3 programming experience in accordance with one or more transport protocols. Encoder
4 module 212, therefore, controls the manner by which the enhanced programming content,
5 prepared by interactive module 210 for delivery by a Transport A protocol or Transport B
6 protocol, is delivered to receiver modules 216a-216n. More specifically, in one embodiment,
7 encoder module 212 controls the particular manner by which the encoded enhanced
8 programming content is inserted onto the communication line between encoder module 212
9 and receiver modules 216a-216n, while facilitating delivery of the enhanced programming
10 content created by programming module 218.

11 One skilled in the art may recognize that encoder module 212 may have various other
12 configurations that are capable of performing the desired function. For example, although
13 only a single encoder module 212 is depicted, one skilled in the art will recognize that
14 multiple encoder modules 212a-212n can be used.

15 Encoder module 212 optionally communicates with receiver modules 216a-216n
16 through network 214. Network 214 may be a television broadcast network, a satellite
17 network, cable network, LAN/WAN, a wireless network, a packetized network, a real-time
18 network, and various other networks known by one skilled in the art. Other networks are
19 applicable so long as the network configuration and architecture allows communication
20 between encoder module 212 and receiver modules 216a-216n and facilitates delivery of
21 television programming and enhanced programming content to receiver modules 216a-216n.

22 Communication between encoder module 212 and receiver modules 216a-216n, and
23 optionally communication between all modules 210, 212, 216a-216n, and 218 may be
24 achieved by a variety of communication line connections. For example, communication may

1 be achieved through, such as but not limited to, cable or cable modems, satellite, telephone
2 lines, whether analog or digitally based, the Internet, DSL, G-Lite, wireless technology, other
3 high-speed data connections, or any other suitable transmission technology or medium. One
4 skilled in the art may identify various other types of network and/or communication line
5 connections that are capable of performing the desired function of allowing communication
6 between modules 210, 212, 216a-216n, and 218.

7 It may be appreciated by one skilled in the art, that in some configurations of the
8 present invention, system 200 is devoid of encoder 212 and optionally network 214. For
9 example, in some other configurations, interactive module 210 is incorporated within one or
10 more of receiver modules 216a-216n. Illustratively, when the file containing the XML
11 schema of the present invention is incorporated within a removable storage media, such as a
12 DVD, CD, magnetic disk, and the like each receiver module 216a-216n may interpret the
13 XML schema and subsequently deliver the enhanced programming content to the viewer in
14 accordance with such a XML schema. In another configuration, system 200 is devoid of
15 encoder 212, while including interactive module 210, network 214, programming module 218
16 and receiver module 216a-216n. In such a case, the enhanced programming experience can
17 be delivered to receiver module 216a-216n separately from the audio/video programming.
18 For instance, a viewer may receive an XML file, or other appropriate file, containing the
19 enhanced programming experience schema through an electronic mail message ("e-mail") or
20 upon some storage device, whether optically read, magnetically read or the like. Such XML
21 file is used with the audio/video programming created by programming module 218 and/or
22 interactive module 210 to give a viewer an enhanced programming experience.

23 Each receiver module 216a-216n represents, in one embodiment, the various hardware
24 and/or software modules that receive programming from programming module 218 and

1 enhanced programming content from interactive module 210. For example, receiver module
2 216a-216n may include one or more set-top boxes, as described above with respect to home
3 entertainment system 10. Each receiver module 216a-216n may, therefore, include one or
4 more display devices 14 to present the viewer with the programming and/or the enhanced
5 programming content. Each receiver module 216a-216n may take the form of management
6 system 12 or home entertainment system 10, depending on the complexity of receiver module
7 216a-216n, as known by one skilled in the art. Alternatively, receiver module 216a-216n may
8 be a computer that is configured with one or more tuners to allow delivery of a television
9 broadcast and the enhanced programming content.

10 Referring now to Figure 3, a more detailed illustrative schematic representation of one
11 embodiment of the present invention is depicted. To simplify the discussion contained herein,
12 reference will be made to delivery of enhanced programming content to a single receiver
13 module 216. Although the following discussion is specific to the configuration of the present
14 invention with only one receiver module 216, one skilled in the art may recognize that the
15 present invention may be incorporated within a system where multiple receiver modules
16 216a-216 deliver programming and enhanced programming content to the viewer.
17 Additionally, other systems that may utilize the beneficial properties of the present invention
18 may include multiple interactive modules, programming modules, encoder modules, and the
19 like.

20 As shown, application module 222 of interactive module 210 includes an interface
21 module 230 that allows an author of enhanced programming content or some other application
22 to communicate with a stream module 232. Hence, interface module 230 may be a graphic
23 user interface (GUI) that aids an author to develop the announcement (having an
24 announcement data structure), trigger (having a trigger data structure), package (having a

1 package data structure), a timeline (having a timeline data structure), carousel (having a
2 carousel data structure), and other parameters used to define the enhanced programming
3 content. Alternatively, interface module 230 may represent one or more application program
4 interfaces (APIs) that an author may use to generate the enhanced programming content.
5 Similarly, the APIs may allow other authoring tools to communicate with stream module 232
6 or may allow an author to generate an application that tracks the delivery of the enhanced
7 programming content to receiver module 216. In yet another configuration, interface module
8 230 may retrieve stored enhanced programming content from data storage module 220.

Sub. 9 e' In communication with interface module 230 is stream module 232. Stream module
10 232 represents various applications that may be used to generate the enhanced programming
11 content, whether such content is newly created by an author via interface module 230 or
12 stored content retrieved from a data source. For example, stream module 232 may represent a
13 dynamic link library (DLL) that generates the enhanced programming content in accordance
14 with the schema of the present invention or otherwise manipulates stored enhanced
15 programming content retrieved via interface module 230. In another configuration

16 Stream module 232 facilitates use of the schema of the present invention, both by an
17 author who may develop enhanced programming content to be delivered through the transport
18 A protocol, the transport B protocol, or both the transport A and B protocols. Further,
19 enhanced programming content developed in accordance with the schema of the present
20 invention may be viewed under the NTSC, PAL, SECAM, or other standards for television
21 and video transmission. In this manner, the present invention both provides a mechanism or
22 tool that allows an author to create enhanced programming content that complies with the
23 schema of the present invention, while optionally providing a mechanism or tool to prepare
24

1 stored enhanced programming content for viewing at receiver module 216 as the enhanced
2 programming experience.

3 Referring now to Figure 4, a more detailed functional representation of stream module
4 232 is illustrated. As shown, stream module 232 includes a variety of functional modules,
5 each of which represents one or more elements of the schema that is created or retrieved and
6 manipulated by stream module 232. Such schema and the associated data structures related to
7 the enhanced programming content, are preferably stored within an Extensible Markup
8 Language (XML) schema stored with one or more files, records, and fields. Although
9 reference will be made to the schema being incorporated within a XML schema, it may be
10 appreciated by one skilled in the art that the present invention may be practiced using other
11 schemas and other software languages, web based languages, and the like.

12 One module illustratively included within stream module 232 is an announcement
13 module 270. Announcement module 270 aids the author of enhanced programming content
14 with developing a broadcast that identifies the availability of enhanced programming content.
15 For example, the announcement module 270 generates or retrieves an announcement element
16 or announcement having an announcement data structure. Subsequently, announcement
17 module 270 delivers the announcement to encoder module 214 in accordance with the other
18 modules and functions of stream module 232, i.e., the timeline module or carousel module
19 discussed hereinafter.

20 The announcement includes various elements (with associated attributes) that are
21 defined by the author of the announcement, as well as default values or values dynamically
22 created or modified by interactive module 210. In a preferred embodiment, the announcement
23 includes one or more of the elements listed in Table 1.

Table 1

Element	Description
sendingIP	Defines or optionally retrieves an internet protocol (IP) address of the hardware and/or software modules that deliver the enhanced programming. For example, the IP address may be a server that incorporates one or more of interactive module 210, encoder module 214, and/or programming module 218.
sessionID	Sets or optionally retrieves an identification to bind the announcement created by the announcement element to the particular programming created by programming module 218.
sessionversion	This indicates the particular version of the announcement delivered to receiver module 216. In this manner, receiver module 216 may identify whether it has received a current announcement.
sessionURL	This indicates a world-wide web uniform resource locator ("URL") where viewers may obtain additional information regarding the enhanced programming session that is currently available.
sessionlabel	This defines a human-readable name for the enhanced programming session that may be obtained through receiver module 216.
username	This identifies the owner of the enhanced programming session.
Uuid	This specifies the unique identifier (UUID), which identifies the enhanced programming.
Email	This defines the electronic mail message address at which the broadcaster of the enhanced programming may be contacted. This element may reference contact person information, such as name and address of the contact person, whether the address is a street address, post office box address, or some other address.
Phone	This defines a telephone number and name of the broadcaster of the enhanced programming.
Time	This defines the start and stop times for the enhanced programming session that is available.
maxcachesize	This provides an estimated maximum level of cache storage (in kilobytes) that may be required during the enhanced programming session.
secondstoend	This defines the number of seconds in the future for which the announcement is valid.
LangID	This specifies the default language for the enhancement session.
SDPlangID	This defines the language for the SDP session description.
Dataconfig	This element defines the transmission parameters for the data packages that are sent to receiver module 216 when a viewer requests the enhanced programming. For example, the transmission parameters may include the IP address from which the enhancement will be transmitted, the IP port where the enhancement will be

	transmitted, the maximum rate, in bits per second of the transmission, and the time to live for the packets.
triggerconfig	This specifies the transmission parameters for the triggers that are sent to deliver the enhanced programming to the viewer. In one embodiment, the transmission parameters are the same as the dataconfig element.

Another illustrated functional module included in stream module 232 is a trigger module 272. Trigger module 272 defines a trigger having a trigger data structure that activates or initiates the delivery of enhanced programming content to receiver module 216 in response to a selection made by the viewer of receiver module 216. In this particular embodiment, trigger module 272 represents a trigger, or application that aids an author with the creation of the trigger. Alternatively, trigger module 272 may act to retrieve a trigger from a stored schema file, document, or data source and subsequently prepare the same for delivery to receiver 216.

The trigger, in one embodiment, includes and defines the name of the data to be sent as part of the enhanced programming experience and the communication protocol used to deliver the enhanced programming. For example, the trigger defines a source of the enhanced programming content and the delivery protocol to be used, such as transport A protocol, transport B protocol, or a combination thereof. Trigger module 272 aids an author with defining a variety of different elements and attributes associated with the trigger, such as those illustrated in Table 2.

Table 2	
Element	Description
TriggerURL	This defines the URL where the enhanced program may be obtained. The URL may be given in HTTP:\\, FTP:\\, or LID:\\ schemes.
Trigger	This optionally defines the name for the trigger.
Trigger Expires	This defines the date when the trigger will become invalid or expire

	if the client or viewer does not initiate the trigger. The trigger expiration date may be provided in a number of manners, such as year/month/date, hours/minutes/seconds, and the like.
Trigger Script	This defines a script fragment that may be executed within the currently running or playing enhanced programming. For example, if the trigger is activated when an HTML page is currently being displayed, the script either defined under the trigger script element or accessible by reference from the trigger script element may be displayed.

As illustrated in Figure 4, stream module 232 optionally includes a raw trigger module 274. Raw trigger module 274 is adapted to define a trigger that has already been formatted by a different application and is to be sent to receiver module 216 without being reformatted. In this illustrative configuration, raw trigger module 274 represents a raw trigger generated by an author through either interface module 230 or a raw trigger retrieved from data storage module 220. The raw trigger includes a name attribute that defines the particular name of raw trigger module 274 and as an identifier of the particular transport protocol that will be used to deliver the raw trigger.

Stream module 232 may further include a package module 276. Package module 276 aids an author to define the data, such as enhanced programming content, deliverable to receiver module 216 upon activation or acceptance of the announcement. Package module 276, therefore, represents a package having a package data structure that defines the location of the actual enhanced programming content deliverable to receiver module 216. The package is generated by stream module 232 or retrieved by stream module 232 from data storage module 220.

Package module 276 or the package includes a variety of elements and associated attributes. In one embodiment, the package has a "name" attribute that defines the name of the package, a "content base" attribute that defines "the base URL" for the enhanced

1 programming content to be delivered with the package, and an “expires” attribute that
2 specifies when the package will expire. The “expires” attribute typically operates in a similar
3 manner to that of trigger expire attribute discussed above.

4 Package module 270 may optionally include a file element and a directory element
5 that each have a number of attributes associated therewith. The file element defines a file that
6 may be delivered to receiver module 216 as part of the enhanced programming content.
7 Generally, the file element includes the name of the file, a location of the file on a particular
8 broadcaster’s machine, such as data storage module 220 and/or programming module 218.
9 Alternatively, the file element defines the location of the file on receiver module 216 when
10 stored therein.

11 Further, the file element includes an expiration date that identifies when the file
12 associated with the package will expire or when the file is no longer accessible. In addition,
13 the file element optionally includes a language identification reference to the particular
14 language of the data with the file and a decompress element that specifies whether or not the
15 data from the file should be compressed or decompressed using a variety of formats, such as
16 zip, and the like.

17 The directory element includes one or more of the above-referenced attributes, for
18 example, a source location attribute that defines the location of the directory on interactive
19 module 210 and/or programming module 218 that contains content to be delivered as part of
20 the enhanced programming.

21 Other elements could be defined within the package element, such elements represent
22 content in and of themselves. In one instance, these elements could be identical to well
23 formed HyperText Markup Language or other markup languages appropriate for creating
24 enhanced programming content.

1 According to another aspect of the present invention, stream module 232 optionally
2 includes a timeline module 278. Timeline module 278, or the timeline having a timeline data
3 structure, is generated by an author during development of the various other modules of
4 stream module 232. Alternatively, the timeline module is dynamically created by stream
5 module 232 as the various announcements, trigger, packages, and other elements or modules
6 are retrieved from storage. The timeline defines when the announcements, triggers, packages,
7 and the various other modules and associated elements of the present invention are to be
8 delivered as part of the enhanced programming content. For example, if programming created
9 by programming module 218 is a game show, timeline module 278 defines, in a sequential
10 manner, when an announcement, when using the transport B protocol delivery, is to be
11 delivered to receiver module 216. The announcement notifies the receiver of the availability
12 of the enhanced programming events (in the form of triggers) and content (in the form of
13 packages), and thereby requests the receiver to begin receiving this programming. When
14 Triggers created by trigger module 272 and/or raw trigger module 274 are then delivered in
15 the enhanced programming the receiver may at that time notify the viewer to the availability
16 of enhanced programming and thereby requests a viewer to begin such an experience.
17 Subsequent Triggers containing certain attributes will create events and action in the
18 enhanced programming content. This can be used for synchronization between the
19 audio/video and enhanced programming content. If the viewer wishes to "play along" with
20 the participants in the game show, for example, by pressing a button on input device 26, the
21 triggers created by trigger module 272 and/or raw trigger module 274 are activated and
22 delivered to receiver module 216. Simultaneously, interactive module 210 delivers a package
23 referencing and/or containing the package data created by package module 276.
24 Alternatively, the package is delivered before or after the trigger is delivered to receiver

1 module 216. The particular order in which the delivery occurs is defined the timeline created
2 or prepared by timeline module 278.

3 The timeline defines the occurrences of data transmission through describing one or
4 more events. Each event defines an operation or function of application module 272. For
5 example, the timeline specifies that an event will occur at a specific time, where such event is
6 the delivery of an announcement, trigger, package, and the like. The event time dictates a
7 starting time, a stopping time, a deliver-by time, or optionally a time when all events are to
8 cease for the particular enhanced programming content. Hence, application module 222
9 designates a specified period of time for delivery of each announcement, trigger, package, and
10 the like. This permits interactive module 210 to dynamically organize delivery of the
11 announcement, trigger, package, and the like within the defined period of time.

12 According to another aspect of the present invention, stream module 232 may include
13 a configuration module 280. The configuration module 280 optionally defines the particular
14 transport protocol used to deliver the announcements, triggers, packages, and the like. For
15 example, configuration module 230 defines a configuration element having a configuration
16 data structure that recites which transport protocol is to be used, such as via multi-cast
17 delivery, inserter delivery, router delivery, or various other delivery manners known to one
18 skilled in the art.

19 According to another aspect of the present invention, stream module 232 includes a
20 carousel module 284. The carousel module 284 generates a carousel element having a
21 carousel data structure or optionally to retrieve such carousel element from a storage source,
22 such as data storage module 220. Configuration of the carousel element allows enhanced
23 programming content to be delivered over a communication line connection and with
24

1 hardware and/or software modules associated with the various European delivery devices and
2 systems.

3 Generally, the carousel element defines the number of triggers, announcements,
4 packages, and the like to be delivered to receiver module 216, without the aid of a timeline,
5 such as that associated with timeline module 278. For instance, the carousel element may
6 define that certain triggers, announcements, packages are to be sent in greater numbers than or
7 before other triggers, announcements, packages, and the like. Delivery of the triggers,
8 announcements, and packages is typically performed as quickly as interactive module 210,
9 encoder module 212 and/or programming module 218 may achieve such delivery.
10 Optionally, carousel module 280 may be configured to deliver the various elements, such as
11 announcements, triggers, and packages, following a simulated timeline, and vice versa.
12 Further, in another configuration, carousel module 280 may be configured to deliver the
13 various announcements, triggers, and packages, by a deliver-by time.

14 Communicating with stream module 232 is send module 234. Send module 234
15 represents, in one embodiment, a send.DLL that is configured to deliver the announcements,
16 triggers, packages, and the like to receiver module 216. Send module 234, as illustrated in
17 Figure 4 may include an inserter module 290 and a multi-cast module 292, and optionally a
18 router module 294. Depending on the particular transportation protocol used to deliver the
19 enhanced programming content, send module 234 may activate either inserter module 290,
20 multi-cast module 292, or router module 294. For example, when a trigger is delivered to
21 receiver module 216 via the transport A protocol, send module 234 uses inserter module 290
22 to insert enhanced programming content onto the VBI or some other channel of the
23 communication line connection. Therefore, inserter module 290 performs various functions
24 to achieve delivery of the enhanced programming content to receiver module 216. For

1 example, inserter module 290 obtains a signal from programming module 218 and/or encoder
2 214 and the enhanced programming from interactive module 210 and organizes for delivery
3 of one or more triggers defined within the schema to receiver module 216. Alternatively,
4 when using transport B protocol, send module 234 delivers announcements, triggers, and
5 packages by a combination of inserter module 290, multi-cast module 292, or router module
6 294.

7 Although the discussion above has been referenced to a stream module 232 that
8 includes various separate and optionally distinct modules 270-284, one skilled in the art may
9 appreciate that the functions of each module 270-284 may be incorporated within a single
10 module. Further, the above-described modules may be incorporated within programming
11 module 218 or encoder module 210 to deliver previously created enhanced programming
12 content to receiver module 216. Hence, the above modules both function as authoring tools
13 and optionally delivery tools for the delivery of the enhanced programming content to
14 receiver module 216.

15 Following is a discussion of two exemplary schemas that deliver animated enhanced
16 programming content and experience to a viewer. Initially, discussion will focus on a schema
17 that allows delivery of enhanced programming content through a transport A protocol.
18 Following such a discussion, the same animated enhanced programming content will be
19 discussed with reference to delivery via a transport B protocol. It may be understood by one
20 skilled in the art that the schemas described herein are only illustrative of possible schemas
21 and should not be considered limiting the scope of the appended claims. Further, although
22 reference is made to schemas that specify use of a particular transport protocol, e.g., transport
23 A protocol or transport B protocol, to deliver the enhanced programming content, the present
24

1 invention facilities defining both transport A protocol and transport B protocol within the
2 same schema.

3 The illustrated schemas of the present invention may be incorporated within an XML
4 schema, such as in an XML file or document. Therefore, the XML schema provides a
5 framework within which authors may develop enhanced programming. The framework
6 allows the author to independently create enhanced programming content with the knowledge
7 that the announcements, packages, triggers, timelines, carousels, and other elements that he or
8 she defines will be compatible with existing and future delivery hardware and/or software
9 modules. As mentioned above, the illustrated XML schemas can include one announcement
10 zero or more packages, zero or more triggers, zero or more raw triggers, zero or one timeline,
11 and the like. Each has its associated elements and attributes as commonly understood by
12 those skilled with XML in view of the teaching contained herein.

13 The following schema provides the information that interactive module 210 uses to
14 provide enhanced programming content to a viewer of receiver module 216. The illustrative
15 schema, when correctly used with an enhanced programming system produces an animation-
16 like result on display device 14, such as a television. The schema defines a trigger that
17 launches an HTML page that reduces the television viewing area to the upper left corner and
18 displays an image of a lizard in the remaining screen space, as illustrated in Figure 5. The
19 additional triggers of the illustrative schema animate the lizard image on the screen while
20 leaving the television viewing area unchanged. Specifically, one illustrative schema recites:

21 <!-- This sample demonstrates the Animate content over Transport A -->
22 <itv:ATVEFStream bandwidth="19200" id="Animate Example" xmlns:itv="x-
23 schema:...\atvefplayer\atvefSchema.xml">
24 <itv:tveconfig>
25 <itv:transport_a transporttype="insertter" data="178.178.178.178:2000" />
26 </itv:tveconfig>

```
1      <itv:trigger name="launch" transport="a">
2      <itv:triggerURL>http://itv.microsoft.com/atvefsdk/content/Animated/anim
ate_fs.htm</itv:triggerURL>
3      <itv:triggername>ATVEFPlayer Animate Example</itv:triggername>
4      <itv:triggerexpires>2010-12-31</itv:triggerexpires>
5      </itv:trigger>
6      <itv:trigger name="first" transport="a">
7      <itv:triggerURL>http://itv.microsoft.com/atvefsdk/content/Animated/anim
ate_fs.htm</itv:triggerURL>
8      <itv:triggerscript>top.frames["frame_a"].setFrame(0)</itv:triggerscript>
9      </itv:trigger>
10     <itv:trigger name="second" transport="a">
11     <itv:triggerURL>http://itv.microsoft.com/atvefsdk/content/Animated/anim
ate_fs.htm</itv:triggerURL>
12     <itv:triggerscript>top.frames["frame_a"].setFrame(1)</itv:triggerscript>
13     </itv:trigger>
14     <itv:trigger name="third" transport="a">
15     <itv:triggerURL>http://itv.microsoft.com/atvefsdk/content/Animated/anim
ate_fs.htm</itv:triggerURL>
16     <itv:triggerscript>top.frames["frame_a"].setFrame(2)</itv:triggerscript>
17     </itv:trigger>
18     <itv:timeline loop="0">
19         <itv:event time="0:03" eventtype="trigger">launch</itv:event>
20         <itv:event time="0:20" eventtype="trigger">second</itv:event>
21         <itv:event time="0:30" eventtype="trigger">third</itv:event>
22         <itv:event time="0:40" eventtype="trigger">first</itv:event>
23         <itv:event time="0:50" eventtype="trigger">second</itv:event>
24         <itv:event time="0:60" eventtype="trigger">third</itv:event>
25     </itv:timeline>
26 </itv:ATVEFStream>
```

Initially, the schema defines the base tag for the interactive television experience. In this illustrative example, the base tag is termed ATVEFStream, such as that described above. The ATVEFStream tag, considered as a stream element associated with stream module 232, has attributes associated with the bandwidth that the enhanced programming content is to be delivered over the communication line connection. Such bandwidth is illustrated or defined as 19200 baud; other bandwidths are applicable and known to one skilled in the art. Further, the ATVEFStream tag includes an identification or I.D. attribute designating the name of the enhancement stream by which system 200 (Figure 2) delivers the enhanced programming

1 content. Finally, the ATVEFStream tag includes, optionally, a reference to another schema
2 that is used to validate the authenticity of this particular XML schema. Such validation
3 schema may include a numerical value or, such as in this case, reference to a stored schema
4 file.

5 Following designation of the base tag, the configuration information used to transmit
6 the enhanced programming content is defined within the tveconfig element similar to the
7 configuration element associated with configuration module 280. Since the above defined
8 illustrative example is a transport A delivery system, the transport type is inserter, designating
9 "inserter" module 290 as the delivery module used to transmit the enhanced programming
10 content to receiver module 216. In addition, the tveconfig element defines the configuration
11 used when transmitting the enhanced programming content, such as an IP address. Such
12 configuration information may or may not be used by interactive module 210 depending on its
13 mode of configuration for use with encoder module 212.

14 Subsequent to defining the configuration for delivery of the enhanced programming
15 content, the sample schema defines a plurality of triggers associated with the delivery of the
16 enhanced programming content. For example, this illustrative example includes a launch
17 trigger, a first trigger, a second trigger, and a third trigger. As mentioned above, each trigger
18 includes a name that the base tag uses to refer to the particular triggers. Further, each trigger
19 includes a designation of the type of transport used to delivery the enhanced programming
20 content. As shown, the launch trigger includes a trigger URL that designates the location
21 where the data associated with this trigger is stored. In some situations, an expiration date is
22 included that defines when the link or trigger is to expire and will no longer activate or begin
23 an enhanced programming experience on a receiver module 216a-216n. In some other
24 situations, a trigger script is included that defines a script fragment that is executed within the

1 enhanced programming content is delivered to receiver module 216. For example, for the
2 second trigger, the trigger ECMAScript references "frame_a" at the top of the frame of the
3 animated programming.

4 Finally as illustrated in the above-referenced exemplary schema, the timeline is
5 included to control when each trigger is to be delivered, which order the triggers are to be
6 delivered, and how many of the triggers will be delivered launched. In this particular
7 configuration, the timeline element includes a loop attribute that is defined as zero, to
8 reference that the present timeline does not loop to deliver the enhanced programming content
9 multiple times to receiver module 216. Various other values may be included within the loop
10 attribute as known by one skilled in the art. The timeline further includes a number of events
11 designating a delivery time, relative to the start time when each event is to be delivered to
12 receiver module 216. The time may designate the hours, minutes, seconds, and optionally
13 video frames after the commencement of the enhanced programming experience is desired to
14 deliver a particular element, such as the triggers.

15 It would be appreciated by one skilled in the art, that various other configurations of
16 the schema of the present invention might be implemented to provide a viewer with an
17 enhanced programming experience, no matter the type of system being used to deliver the
18 enhanced programming experience. Additionally, the schema may allow and provide an
19 enhanced programming author a framework within which they may design and prepare
20 enhanced programming.

21 Following hereinafter is another configuration of an illustrative schema to deliver the
22 animated enhanced program experience illustrated in Figure 5. This particular illustrative
23 schema, however, uses a transport B protocol to deliver the enhanced programming.
24 Specifically, the illustrative schema recites:

```
1 <!-- This sample demonstrates the Animate content over Transport B -->
2 <itv:ATVEFStream bandwidth="56000" id="Animate Example"
3 mlns:itv="x-schema:..\atvefplayer\atvefSchema.xml">
4   <itv:tveconfig>
5     <itv:transport_b transporttype="multicast" data="0" />
6     <!-- itv:transport_b transporttype="insert" data="178.178.178.178:3000"
7 headercompressionratio="4"/-->
8   </itv:tveconfig>
9   <itv:announcement>
10     <itv:sessionname>Animate Example</itv:sessionname>
11     <itv:sessionURL>http://www.microsoft.com</itv:sessionURL>
12     <itv:sessionlabel>Animate Example</itv:sessionlabel>
13     <itv:email ename="DTV Tools" address="dtvtools@microsoft.com" />
14     <itv:time start="2000-01-01" stop="2010-12-31" />
15     <itv:secondstoend>6000</itv:secondstoend>
16     <itv:dataconfig ip="224.0.0.1" port="127" maxbitrate="56000" TTL="4" />
17     <itv:triggerconfig ip="224.0.0.1" port="128" maxbitrate="19200" TTL="4" />
18   </itv:announcement>
19   <itv:trigger name="launch" transport="b">
20     <itv:triggerURL>lid://AnimateSample/animate_fs.htm</itv:triggerURL>
21     <itv:triggername>Animate Enhancement</itv:triggername>
22     <itv:triggerexpires>2010-12-31</itv:triggerexpires>
23   </itv:trigger>
24   <itv:trigger name="first" transport="b">
25     <itv:triggerURL>lid://AnimateSample/animate_fs.htm</itv:triggerURL>
26     <itv:triggerscript>top.frames["frame_a"].setFrame(0)</itv:triggerscript>
27   </itv:trigger>
28   <itv:trigger name="second" transport="b">
29     <itv:triggerURL>lid://AnimateSample/animate_fs.htm</itv:triggerURL>
30     <itv:triggerscript>top.frames["frame_a"].setFrame(1)</itv:triggerscript>
31   </itv:trigger>
32   <itv:trigger name="third" transport="b">
33     <itv:triggerURL>lid://AnimateSample/animate_fs.htm</itv:triggerURL>
34     <itv:triggerscript>top.frames["frame_a"].setFrame(2)</itv:triggerscript>
35   </itv:trigger>
36   <itv:package name="active_content" contentbase="lid://AnimateSample"
37 expires="2010-12-31">
38     <itv:file name="animate_fs.htm"
39 sourcelocation="..\Samples\Content\Animated" MIMElocation="/"
40 type="text/html" compress="0" expires="2010-12-31" languageID="1" />
41     <itv:file name="animate_a_tv.htm"
42 sourcelocation="..\Samples\Content\Animated" MIMElocation="/"
43 type="text/html" compress="0" expires="2010-12-31" languageID="1" />
44     <itv:file name="animate_a.htm"
45 sourcelocation="..\Samples\Content\Animated" MIMElocation="/"
46 type="text/html" compress="0" expires="2010-12-31" languageID="1" />
```



```
1      <itv:file name="animate_b.htm"
2      sourcelocation="..\Samples\Content\Animated" MIMElocation="/"
3      type="text/html" compress="0" expires="2010-12-31" languageID="1" />
4      <itv:file name="animate_c.htm"
5      sourcelocation="..\Samples\Content\Animated" MIMElocation="/"
6      type="text/html" compress="0" expires="2010-12-31" languageID="1" />
7      <itv:file name="blank.htm" sourcelocation="..\Samples\Content"
8      MIMElocation="/" type="text/html" compress="0" expires="2010-12-31"
9      languageID="1" />
10     <itv:file name="webtv3_1.jpg"
11     sourcelocation="..\Samples\Content\Animated\images" MIMElocation="/images/"
12     type="image/jpeg" compress="0" expires="2010-12-31" languageID="1" />
13     <itv:file name="webtv3_2.jpg"
14     sourcelocation="..\Samples\Content\Animated\images" MIMElocation="/images/"
15     type="image/jpeg" compress="0" expires="2010-12-31" languageID="1" />
16     <itv:file name="webtv3_3.jpg"
17     sourcelocation="..\Samples\Content\Animated\images" MIMElocation="/images/"
18     type="image/jpeg" compress="0" expires="2010-12-31" languageID="1" />
19     </itv:package>
20     <itv:timeline loop="0">
21       <itv:event time="0:01" eventtype="announcement" />
22       <itv:event time="0:03" eventtype="package"> active_content </itv:event>
23       <itv:event time="0:30" eventtype="trigger">launch</itv:event>
24       <itv:event time="0:33" eventtype="trigger">second</itv:event>
25       <itv:event time="0:36" eventtype="trigger">third</itv:event>
26       <itv:event time="0:39" eventtype="trigger">first</itv:event>
27       <itv:event time="0:42" eventtype="trigger">second</itv:event>
28       <itv:event time="0:45" eventtype="trigger">third</itv:event>
29     </itv:timeline>
30   </itv:ATVEFStream>
```

The schema described above includes similar elements described with respect to the transport A animate illustrative example. There are, however, significant differences between the two schemas. For example, the tveconfig element defines the transport configuration as a multicast type transport configuration, rather than as an inserter type delivery. The tveconfig, transport type, attribute may have a value of multicast, inserter, or router, thereby defining the type of connection used to transmit enhanced programming. As illustrated, the tveconfig element includes a header compression ratio attribute, having a value of 4. This attribute defines how often uncompressed headers for Internet Protocol datagrams are to be sent to

1 receiver module 216 according to a compression algorithm for unidirectional datagram
2 transmission.

3 As illustrated above, enhanced programming content delivered by a transport B
4 protocol includes an announcement, optionally generated or retrieved by announcement
5 module 270 and/or intervention module 210. The announcement, as described above,
6 includes information related to the availability of the enhanced programming content. For
7 example, the session name for this particular announcement may be "animate example," while
8 the various URLs and labels associated with this announcement are designated appropriately
9 in the above-referenced schema. With respect to the dataconfig attribute, an IP address may
10 be defined with the appropriate port and maximum bit rate for transfer of enhanced
11 programming. Further, the dataconfig attribute may include a time-to-live (TTL) designation
12 for the Internet Protocol datagrams making up the transmission format and as understood by
13 someone familiar in the art.

14 Another significant difference between the schemas discussed with respect to transport
15 A protocol and this particular schema is the designation of zero or more packets or packages
16 that contain the enhanced programming. For example, the package illustrated in the above
17 schema is designated with a name "active_content." The base URL for the content of such
18 package in the receiver module 216 (i.e., storage module 48 or 50) is identified as
19 lid:\\AnimateSample and is designated to expire from the receiver module 216 (i.e., storage
20 modules 48 or 50) in 2010-12-31. Such a package, as illustrated, includes: (i) various files
21 each with different names and associated source location information of when the file is
22 stored on an interactive module 210 and/or programming module 218, (ii) the location of the
23 file on receiver module 216 relative to the package content base, designated by
24 MIMELocation, (iii) whether or not the data should be delivered compressed and required to

1 be uncompressed, where a value of "zero" represents "no," while a reference value of "one"
2 represents "yes." An expiration date and a language identification value, where one is the
3 default value for the English language, may also be included with the attributes of the package
4 element.

5 Referring now to Figure 6, an illustrative flow diagram representing or depicting the
6 creation and delivery of a schema file or document in accordance with the present invention
7 as depicted. Initially, as depicted by block 300, application module 222 retrieves a schema
8 document from data structure module 220. This may be initiated by delivery of programming
9 that has enhanced programming content included therein, such as an announcement, which
10 provides a viewer with an enhanced programming experience. For example, when
11 programming module 218 incorporates both interactive module 210 and encoder module 212,
12 an author may associate a specific schema document, with associated enhanced programming
13 content, with the programming created by programming module 218.

14 Before delivery of the programming and/or the enhanced programming content, or
15 optionally simultaneously with the delivery of programming, interactive module 210, and/or
16 application module 222 verifies the authenticity of the schema document, as depicted by
17 block 302. This may be achieved in a variety of manners, such as comparing the structure,
18 configuration or format of the schema document against a standardized schema document,
19 stored in data storage module 220.

20 Once the schema document has been verified, application module 222 organizes the
21 enhanced programming content described or defined by the schema document in preparation
22 for delivery to receiver module 216, as depicted by block 304. This may be accomplished by
23 announcement module 270 preparing the announcement, trigger module 272 preparing the
24 trigger, package module 276 preparing the package, and timeline module 278 and/or carousel

1 module 284 organizing the announcements, triggers, and packages in accordance with a
2 defined timeline or carousel, optionally contained within the schema document. Such
3 preparation, is illustratively depicted in Figure 6 by block 304.

4 Following preparation of enhanced programming content, and associated timeline
5 and/or carousel, system 200 begins to deliver the programming to receiver module 216. In
6 accordance with the timeline, which may be "zeroed" to the beginning time of the
7 programming, application module 222, and more specifically send module 234, retrieves the
8 announcements, triggers, packages, and delivers the same via inserter module 290, multicast
9 module 292, or router module 294 to receiver module 216 by way of encoder module, as
10 illustrated by block 306.

11 Alternatively, instead of selecting or retrieving a stored schema document from some
12 data source, such as data storage module 220, interactive module 210 aids an author with the
13 creation of enhanced programming content associated with programming generated by
14 programming module 218. For example, as described previously, an author, optionally
15 simultaneously with the delivery of programming to receiver module 216, generates enhanced
16 programming content using application module 222. The author uses interface module 230 in
17 combination with stream module 232 to create a schema document with the appropriate
18 announcements, triggers, packages, timelines, and other elements and data, with associated
19 attributes, to deliver enhanced programming content to a viewer or receiver module 216.

20 In still another situation, once the author has created the enhanced programming
21 content and associated schema document, the author may save the schema document and the
22 associated enhanced programming content in data storage module 220 for further access,
23 using the method described with respect to Figure 6, or some other method known by one
24 skilled in the art.

1 The present invention may be embodied in other specific forms without departing
2 from its spirit or essential characteristics. The described embodiments are to be considered in
3 all respects only as illustrative and not restrictive. The scope of the invention is, therefore,
4 indicated by the appended claims rather than by the foregoing description. All changes which
5 come within the meaning and range of equivalency of the claims are to be embraced within
6 their scope.

7 What is claimed and desired to be secured by United States Letters Patent is:
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